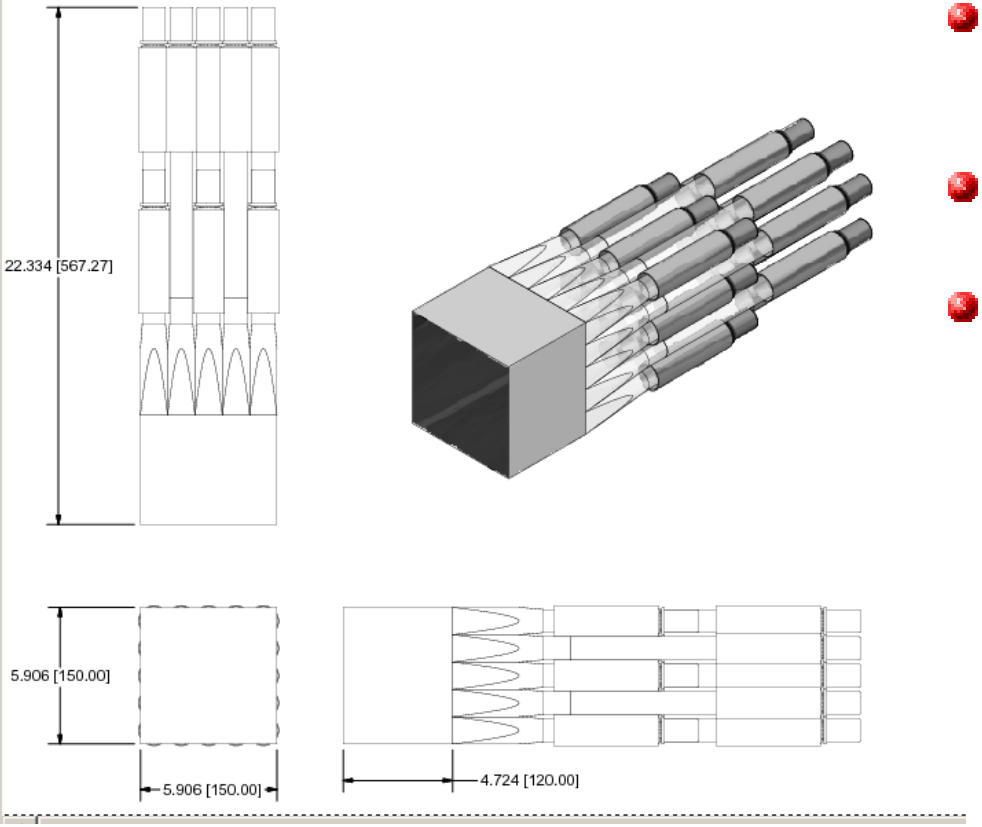
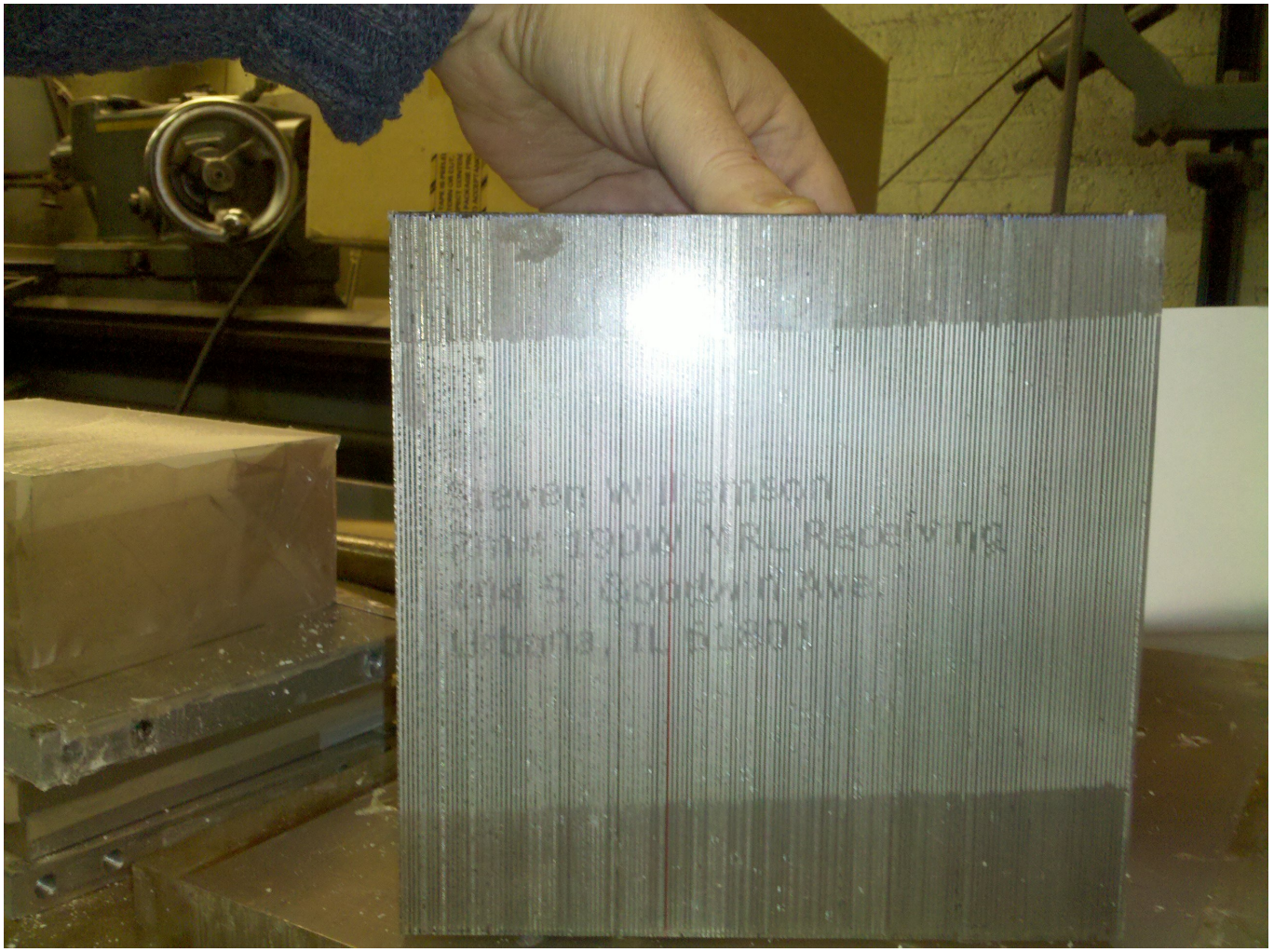
W-scifi Calo Test for Muon g-2

- Primary goal: Develop segmented calorimeters for the proposed g-2 expt at FNAL. Segmentation allows spatial separation of pileup electrons (0-3 GeV)
  - Original calorimeters used Pb-scifi (15cm x 15cm x 22cm) readout by 4 2" PMTs, outputs summed in 2x200 MHz WFD
  - Testing a W-scifi design read-out in 3cm x 3cm blocks



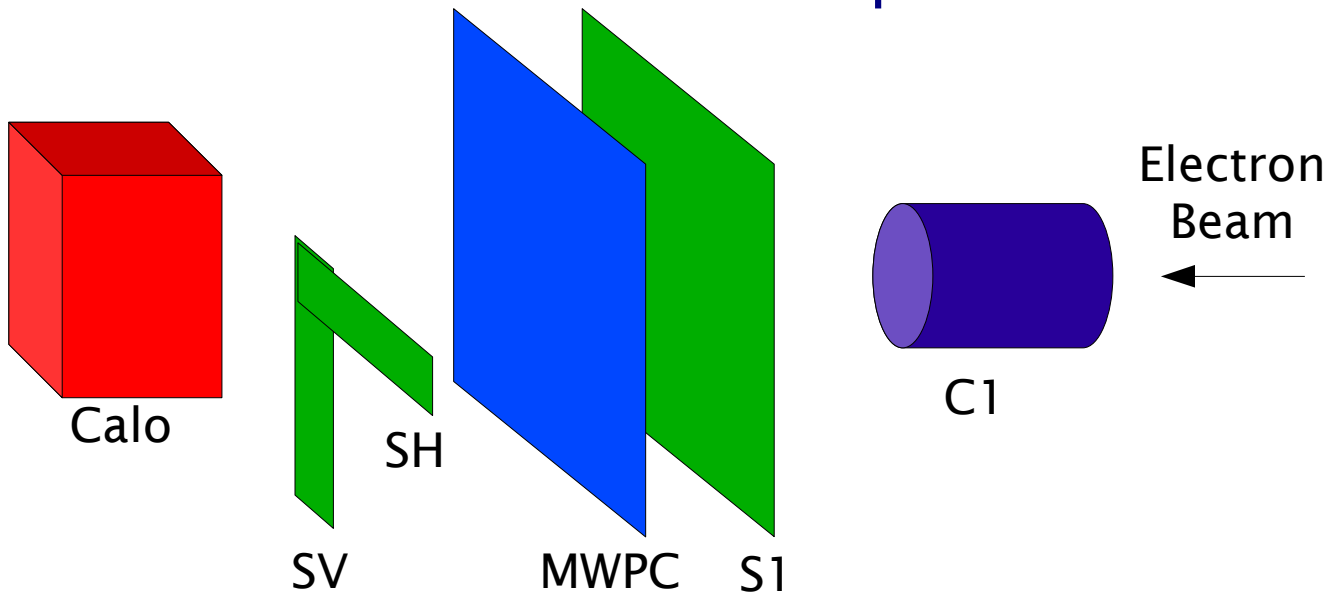
- Decay electron direction in original g-2 was perp to fiber direction, good for sampling bad for pileup
- In FNAL design fibers pitched at 5 degrees from 3 GeV incoming elec
- Purpose of test
  - Test energy resolution/light yield with 0.5-4 GeV electrons
  - Function of angle wrt beam
  - Moller radius, efficiency of pileup separation
  - Other data: pulse shapes, light loss at boundaries, albedo, SiPM readout...

Picture of prototype



- Alternating layers of 0.5 mm tungsten plate, with 0.5 mm diameter fiber ribbons
- 15 cm x 15 cm and 12 cm deep

Test Beam Setup



- Cerenkov counter (C1) upstream, everything else like scintillators (S1, SH, and SV) and wire chamber (MWPC) as close as possible to calorimeter. 120 lb calorimeter on x-y translation table. Occasionally will need to rotate calorimeter, can just plan to do rotations manually. Have 2cm x 9cm SH and SV here from Urbana.
- DAQ trigger on S1⊕C1, scope trigger on either S1⊕C1 or SH⊕SV.
- S1, SH, and SV also readout in CAMAC 2249A ADC
- Calo outputs readout in CAMAC 2249A ADC
- Instrumented, (9cm x 9cm x 23cm) Pb-scifi block here now, W-scifi arrives Monday

Tentative schedule for this week

- May 11th (today)
  - DAQ expert Volodya Tischenko arrives
  - Need to get with Erik to start working on adding beam counters and calo ADC channels to existing CAMAC DAQ used for MWPC
  - Volodya might also start working on a secondary DAQ system to readout some pulse shapes via WFD
  - Good to get example of output file to start writing some offline tools
- May 12th-13th (Wed & Thurs)
  - Brendan, Chris, & Volodya working with Paolo Privitera's students, nice to get C1, S1, SH, and SV established
  - Establish electron beam rates at 0.5 MeV/c to 4 GeV/c in 500 MeV steps
- May 14th (Fri)
  - Setup MWPC, Pb-scifi calorimeter, & DAQ
  - OCR review to allow beam over the weekend
- May 15th-16th (Sat-Sun)
  - Measure beam profiles, dp/p at 0.5 MeV/c and 1 GeV/c with Pb-scifi
- May 17th More g-2 collaborators arrive with W-scifi in hand